II. In the Claims:

1. Cancelled.

2. Cancelled.

3. (Currently Amended) ~~The volume rendering method of claim 2~~ A method for rendering a volume of voxel data with shading and opacity, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the method comprising the steps of:

calculating a revised value of opacity for each of the voxels in the volume, by the revised value of opacity of a voxel being dependent upon its initial value of opacity and the revised value of opacity of voxels proximate thereto; and

calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels, wherein the step of calculating a revised value of opacity further comprises the steps of:

creating a cell of voxels surrounding each voxel in the volume, wherein all voxels in each cell are arranged into groups so that each voxel in each group of voxels within each cell are positioned one behind the other in a line parallel to the primary direction of light;

setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in each cell equal to its initial value of opacity; and

setting the revised value of opacity of all other voxels in each group of voxels in each cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the adjacent other voxel, and setting the revised value of opacity of the adjacent other voxel equal to its initial value of opacity if the revised value of opacity of the closer voxel is less than the initial value of opacity of the adjacent other voxel.

4. (Originally Submitted) The volume rendering method of claim 3 wherein the step of calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises the steps of:

combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of each cell; and

combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of each cell.

5. (Currently Amended) ~~The volume rendering method of claim 1~~ A method for rendering a volume of voxel data with shading and opacity, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the method comprising the steps of:

calculating a revised value of opacity for each of the voxels in the volume, by the revised value of opacity of a voxel being dependent upon its initial value of opacity and the revised value of opacity of voxels proximate thereto; and

calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels, wherein the step of calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises the steps of:

combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of each cell; and

combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of each cell.

6. (Originally Submitted) The volume rendering method of claim 4 further comprising the steps of:

calculating shading for the volume using the opacity gradient; and

displaying the rendered volume on the display device.

7. Cancelled.

8. (Originally Submitted) A method for rendering a volume of voxel data with shading and opacity dependent upon the direction of a source of light specified to be illuminating the volume for rendering, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the method comprising the steps of:

(1) calculating a revised value of opacity for a first voxel in the volume by creating a cell of voxels surrounding the first voxel, wherein all voxels in the cell are arranged into groups so that each voxel in each group of voxels within the cell are positioned one behind the other in a line parallel to the primary direction of light, the revised opacity calculation step further comprising the steps of:

(a) setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in the cell equal to its initial value of opacity; and

(b) setting the revised value of opacity of other voxels in the groups of voxels in the cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the other voxel, and setting the revised value of opacity of the other voxel equal to the initial value of opacity of the other voxel if the revised value of opacity of the closer voxel is less than the initial value of opacity of the other voxel;

(2) repeating the revised opacity calculations step for all other voxels in the volume other than the first voxel; and

(3) calculating a gradient of opacity for each of the voxels in the volume using the calculated revised values of opacity for all voxels.

9. (Originally Submitted) The volume rendering method of claim 8 wherein the step of calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises the steps of:

combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of the last mentioned cell; and

combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of the last mentioned cell.

10. (Originally Submitted) The volume rendering method of claim 8 further comprising the steps of:

calculating shading for the volume using the opacity gradient; and

displaying the rendered volume on the display device.

11. (Originally Submitted) The volume rendering method of claim 9 further comprising the steps of:

calculating shading for the volume using the opacity gradient; and

displaying the rendered volume on the display device.

12. (Originally Submitted) A method for rendering a volume of voxel data with shading and opacity dependent upon the direction of a source of light specified to be illuminating the volume for rendering, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the method comprising the steps of:

(1) calculating a revised value of opacity for a first voxel in the volume by creating a cell of voxels surrounding the first voxel, wherein all voxels in the cell are arranged into groups so that each voxel in each group of voxels within the cell are positioned one behind the other in a line parallel to the primary direction of light, the revised opacity calculation step further comprising the steps of:

(a) setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in the cell equal to its initial value of opacity;

(b) setting the revised value of opacity of other voxels in the groups of voxels in the cell equal to the revised value of opacity of an adjacent voxel in the

same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the other voxel, and setting the revised value of opacity of the other voxel equal to the initial value of opacity of the other voxel if the revised value of opacity of the closer voxel is less than the initial value of opacity of the other voxel;

(2) repeating the revised opacity calculations step for all other voxels in the volume other than the first voxel;

(3) calculating three orthogonal opacity gradient components for the first voxel, one of the orthogonal opacity gradient components being parallel to the primary direction of light, the opacity gradient calculation step further comprising the steps of:

(a) combining the revised values of opacity for the voxels in the cell to derive the three orthogonal opacity gradient components for the first voxel; and

(b) combining the three orthogonal opacity gradient components for the first voxel to derive an opacity gradient that is normal to an isosurface passing through the first voxel;

(c) repeating the opacity gradient calculation step for all other voxels in the volume other than the first voxel.

13. (Originally Submitted) The volume rendering method of claim 12 further comprising the steps of:

calculating shading for the volume using the opacity gradient; and

displaying the rendered volume on the display device.

14. Cancelled.

15. Cancelled.

16. (Currently Amended) ~~The volume rendering apparatus of claim 15~~ An apparatus for rendering a volume of voxel data with shading and opacity, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the rendering apparatus comprising:

means for calculating a revised value of opacity for each of the voxels in the volume, the revised value of opacity of a voxel being dependent upon its initial value of opacity and the revised value of opacity of voxels proximate thereto; and

means for calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels wherein the means for calculating a revised value of opacity further comprises:

means for creating a cell of voxels surrounding each voxel in the volume, wherein all voxels in each cell are arranged into groups so that each voxel in each group of voxels within each cell are positioned one behind the other in a line parallel to the primary direction of light;

means for setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in each cell equal to its initial value of opacity; and

means for setting the revised value of opacity of all other voxels in each group of voxels in each cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the adjacent other voxel, and setting the revised value of opacity of the adjacent other voxel equal to its initial value of opacity if the revised value of opacity of the closer voxel is less than the initial value of opacity of the adjacent other voxel.

17. (Originally Submitted) The volume rendering apparatus of claim 16 wherein the means for calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises:

means for combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of each cell; and

means for combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of each cell.

18. (Currently Amended) ~~The volume rendering apparatus of claim 14~~ An apparatus for rendering a volume of voxel data with shading and opacity, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the rendering apparatus comprising:

means for calculating a revised value of opacity for each of the voxels in the volume, the revised value of opacity of a voxel being dependent upon its initial value of opacity and the revised value of opacity of voxels proximate thereto; and

means for calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels, wherein the means for calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises:

means for combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of each cell; and

means for combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of each cell.

19. (Originally Submitted) The volume rendering apparatus of claim 17 further comprising:

means for calculating shading for the volume using the opacity gradient; and

means for displaying the rendered volume on a display device.

20. Cancelled.

21. (Originally Submitted) Apparatus for rendering a volume of voxel data with shading and opacity dependent upon the direction of a source of light specified to be illuminating the volume for rendering, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the apparatus comprising:

(1) means for calculating a revised value of opacity for a first voxel in the volume by creating a cell of voxels surrounding the first voxel, wherein all voxels in the cell are arranged into groups so that each voxel in each group of voxels within the cell are positioned one behind the other in a line parallel to the primary direction of light, the revised opacity calculation means further comprising:

(a) means for setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in the cell equal to its initial value of opacity; and

(b) means for setting the revised value of opacity of other voxels in the groups of voxels in the cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the other voxel, and setting the revised value of opacity of the other voxel equal to the initial value of opacity of the other voxel if the revised value of opacity of the closer voxel is less than the initial value of opacity of the other voxel;

(2) means for repeating the revised opacity calculations for all other voxels in the volume other than the first voxel; and

(3) means for calculating a gradient of opacity for each of the voxels in the volume using the calculated revised values of opacity for all voxels.

22. (Originally Submitted) The volume rendering apparatus of claim 21 wherein the means for calculating an opacity gradient for each of the voxels in the volume using the calculated revised values of opacity for all voxels further comprises:

means for combining the revised values of opacity for the voxels in each cell to derive three orthogonal opacity gradient components for the voxel in the center of the last mentioned cell; and

means for combining the three orthogonal opacity gradient components for the voxel in the center of each cell to derive an opacity gradient that is normal to an isosurface passing through the voxel in the center of the last mentioned cell.

23. (Originally Submitted) The volume rendering apparatus of claim 21 further comprising:

means for calculating shading for the volume using the opacity gradient; and

means for displaying the rendered volume on the display device.

24. (Originally Submitted) The volume rendering apparatus of claim 22 further comprising:

means for calculating shading for the volume using the opacity gradient; and

means for displaying the rendered volume on the display device.

25. (Originally Submitted) Apparatus for rendering a volume of voxel data with shading and opacity dependent upon the direction of a source of light specified to be illuminating the volume for rendering, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the apparatus comprising:

(1) means for calculating a revised value of opacity for a first voxel in the volume by creating a cell of voxels surrounding the first voxel, wherein all voxels in the cell are arranged into groups so that each voxel in each group of voxels within the cell are positioned one behind the other in a line parallel to the primary direction of light, the revised opacity calculation means further comprising:

(a) means for setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in the cell equal to its initial value of opacity;

(b) means for setting the revised value of opacity of other voxels in the groups of voxels in the cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the other voxel, and setting the revised value of opacity of the other voxel equal to the initial value of opacity of the other voxel if the revised value of opacity of the closer voxel is less than the initial value of opacity of the other voxel;

(2) means for repeating the revised opacity calculations for all other voxels in the volume other than the first voxel;

(3) means for calculating three orthogonal opacity gradient components for the first voxel, and one of the orthogonal opacity gradient components is parallel to the primary direction of light, the opacity gradient calculation means further comprising:

(a) means for combining the revised values of opacity for the voxels in the cell to derive the three orthogonal opacity gradient components for the first voxel;

(b) means for combining the three orthogonal opacity gradient components for the first voxel to derive an opacity gradient that is normal to an isosurface passing through the first voxel; and

(c) means for repeating the opacity gradient calculations for all other voxels in the volume other than the first voxel; and

(4) means for calculating shading for the volume using the opacity gradient.

26. (Currently Amended) The volume rendering apparatus of claim ~~12~~ 25 further comprising:

means for calculating shading for the volume using the opacity gradient; and

means for displaying the rendered volume on the display device.

27. (Originally Submitted) A computer readable medium containing executable instructions for rendering on a display device a volume of voxel data with shading and opacity dependent upon the direction of a source of light specified to be illuminating the volume for rendering, wherein each voxel comprises a value representative of a parameter at a location within the volume and each voxel has an initial value of opacity, the executable program instructions comprising program instructions for:

(1) calculating a revised value of opacity for a first voxel in the volume by creating a cell of voxels surrounding the first voxel, wherein all voxels in the cell are arranged into groups so that each voxel in each group of voxels within the cell are positioned one behind the other in a line parallel to the primary direction of light, the revised opacity calculation means further comprising:

(a) setting the revised value of opacity of the voxel closest to the source of light in each group of voxels in the cell equal to its initial value of opacity; and

(b) setting the revised value of opacity of other voxels in the groups of voxels in the cell equal to the revised value of opacity of an adjacent voxel in the same group of voxels that is closer to the source of light if the revised value of opacity of the closer voxel is equal to or greater than the initial value of opacity of the other voxel, and setting the revised value of opacity of the other voxel equal to the initial value of opacity of the other voxel if the revised value of opacity of the closer voxel is less than the initial value of opacity of the other voxel;

(2) repeating the revised opacity calculations for all other voxels in the volume other than the first voxel;

(3) calculating a gradient of opacity for each of the voxels in the volume using the calculated revised values of opacity for all voxels; and

(4) calculating shading for the volume using the opacity gradient.

28. Cancelled.